O-Engineers

Nov-2018
Learning & Guiding

Engineer of the Month
Page-49

Editorial Note

This month I got the honor of holding the editor in chief of O-Engineers magazine, I need to make lot of changes in this magazine, We at carpediemtech never aimed to make O-Engineers magazine a revenue generating magazine, but we want to give all engineer a platform from where they can show their talent and articular ship in front of the world, we were not, do not and will not charge any fee or payment from our readers and writers, Our slogan is "learning and Guiding" , and as it is my commencement month as Editor in chief of this noble cause centered magazine, let me add one more slogan "Knowledge is priceless"

Happy learning

Long live knowledge sharing

Feedback

I saw many time that you Published articles, which were not defining the complete purpose of research, please work on it and include some more quality checks in your magazine.

(Engineer Nadeem Hasan)

Please include more articles like "Common Wala"

(Engineer Sarmad Masood)

It is alaways worth Reading.

(Engineer Mohammad Noman)

Add job section in magazine, also develop website

(Engineer Taimoor Ali Shah)

PEC Card sale is on high level, please publish some work on it.

(Engineer Farhan Ahmed)

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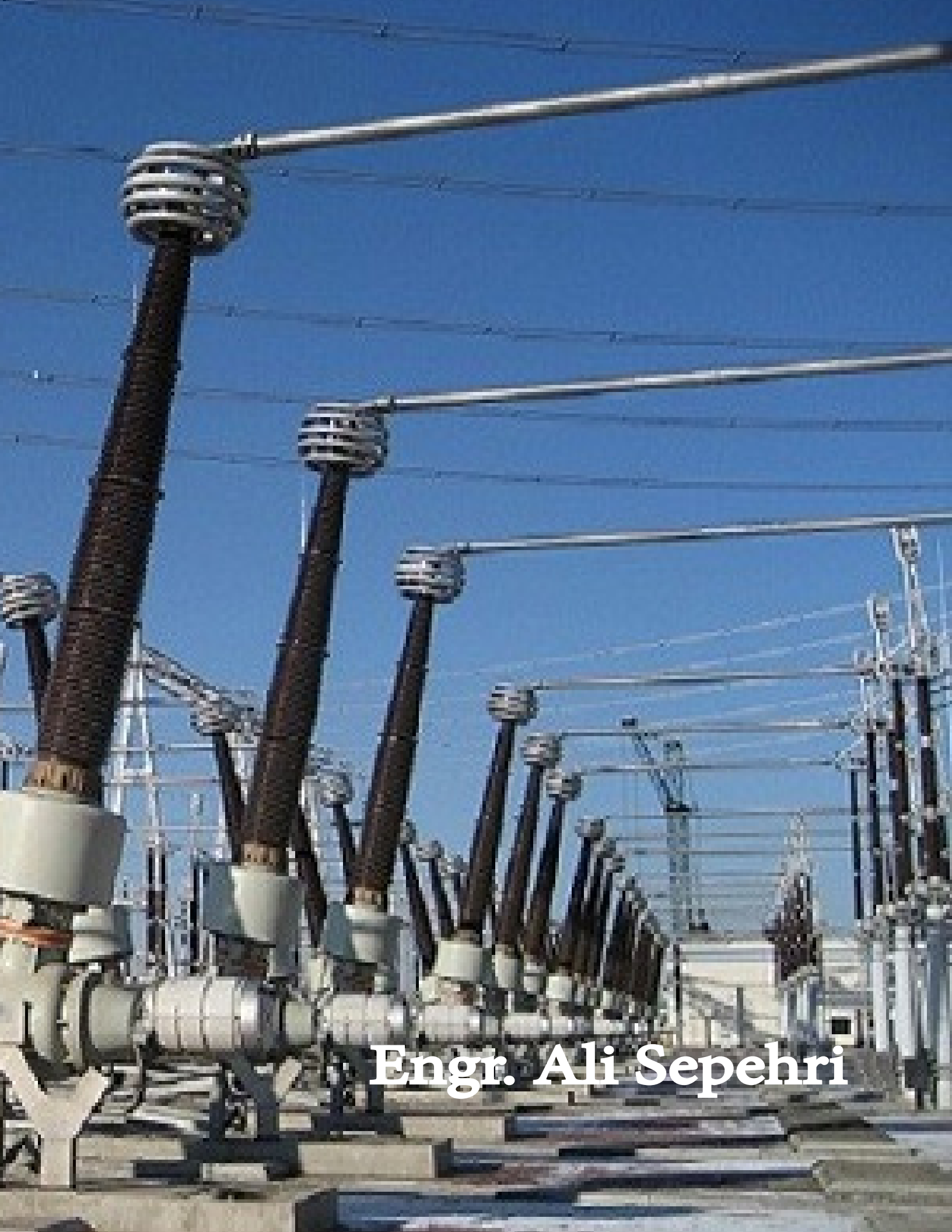
AC Circuit Breakers Routine Tests according to IEC 62271-100



Engr. Ali Sepehri

The routine tests for AC circuit breakers are performed for the purpose of ensuring the quality and guaranteed the performance of the material, design, and assembly of the circuit breaker and are made on each apparatus manufactured.
When the circuit-breaker consists of more than one interrupter per phase, i.e. V-, or T-shaped breaking units, the routine tests are performed on the circuit-breaker assembled in transport units. The transport units (post insulators and breaking units) are in this case mounted on special frames to enable connection to the operating mechanism.

The following items are the routine testing items of AC High voltage circuit breaker according to IEC 62271-1,IEC 62271-100 Standards:

1-Dielectric test on the main circuit:

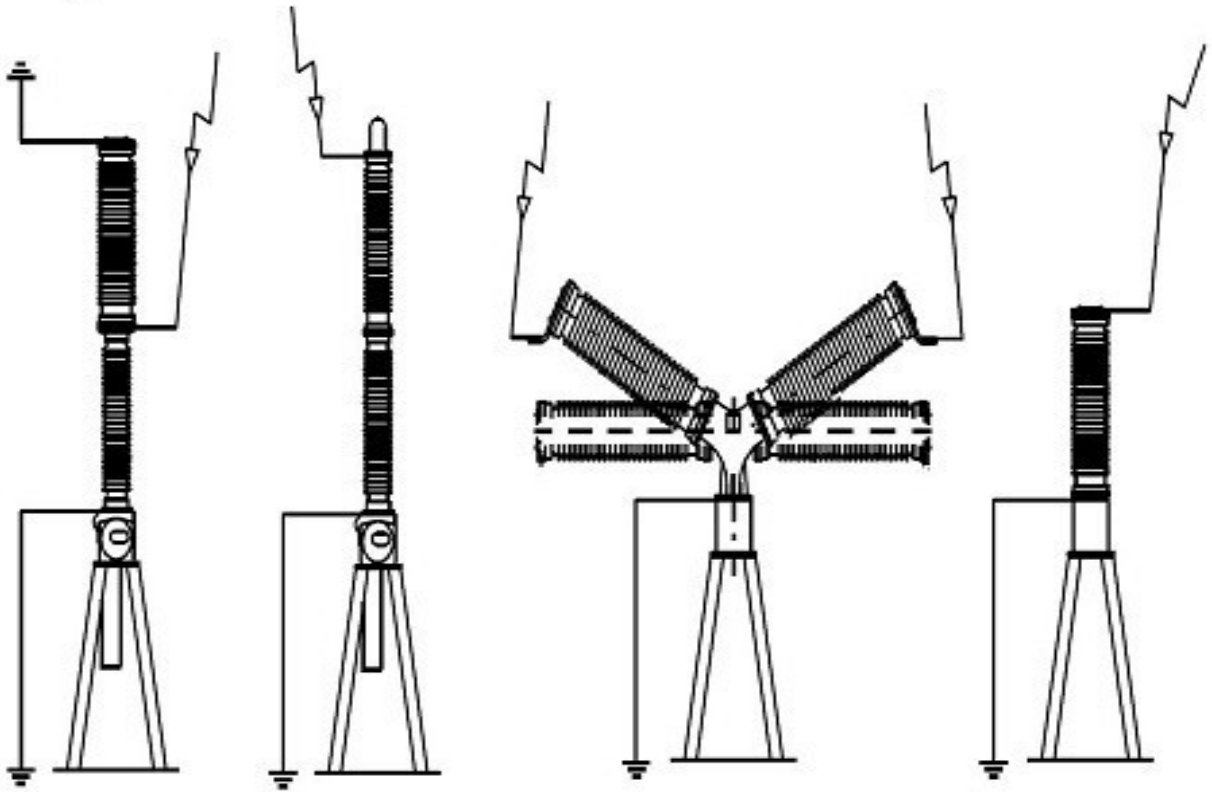
A dry, short-duration power-frequency voltage test shall be applied. The test voltage shall be that specified in column 2 of the following tables(according to the relevant IEC standards. In these

Rated voltage U_r kV (rms value)	Rated power frequency withstand voltage U_d kV (rms value)			Rated lightning impulse withstand voltage U_p kV (peak value)	
	Common value		Across the isolating distance	Common value	Across isolating distance
	Dry 1 min	Wet[c] 10 sec	Dry 1 min		
(1)	(2)	(2a)	(3)	(4)	(5)
4,76 [c]	19	- -	21	60	66
8,25 [c]	36	- -	40	95	105
8,25 [d]	38	30	42		
15 [c]	36	30	40	95	105
15,5 [d]	50	45	55	110	121
25,8 [c]	60	50	66	125	- -
				150	- -
27,0 [c]	60	50	66	125	- -
27,0 [d]	70	60	77	150	165
38 [c]	70	60	- -	150	- -
	80	75	- -	200	- -
38 [d]	95	80	105	200	220
48,3 [c]	105	95	- -	250	- -
48,3 [d]	120	100	132	250	275
72,5 [c]	160	140	- -	350	- -
72,5 [d]	175	145	193	350	385
123 [c]	260	230	- -	550	- -
123 [d]	280	230	308	550	605
145 [c]	310	275	- -	650	- -
145 [d]	335	275	369	650	715
170 [c]	365	315	- -	750	- -
170 [d]	385	315	424	750	825
245 [c]	425	350	- -	900	- -
245 [d]	465	385	512	900	990

Rated voltage U_r (kV r.m.s. value)	Rated short-duration power-frequency withstand voltage U_d kV (r.m.s. value)		Rated switching impulse withstand voltage U_s kV (peak value)			Rated lightning impulse withstand voltage U_p kV (peak value)	
	Phase-to-earth and between phases (Note 2)	Across open switching device and/or isolating distance (Note 2)	Phase-to-earth and across open switching device	Between phases (Notes 2 and 3)	Across isolating distance (Notes 1 and 2)	Phase-to-earth and between phases	Across open switching device and/or isolating distance (Notes 1 and 2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
300	395	435	750	1 125	700(+245)	950	950(+170)
			850	1 275		1 050	1 050(+170)
362	450	520	850	1 275	800(+295)	1 050	1 050(+205)
			950	1 425		1 175	1 175(+205)
420	520	610	950	1 425	900(+345)	1 300	1 300(+240)
			1 050	1 575		1 425	1 425(+240)
550	620	800	1 050	1 680	900(+450)	1 425	1 425(+315)
			1 175	1 760		1 550	1 550(+315)
800	830	1150	1 425	2 420	1 175(+650)	2 100	2 100(+455)
			1 550	2 480			


Switchgear Cont

values, the altitude factor should be considered. The power frequency voltage test is performed with the circuit-breaker in the open position only. This is valid for both single- and multi-unit circuit-breakers.
In the case of circuit breakers constructed by assembling identical breaking and making units in series, the test voltage to be applied across every single unit, when open, shall be the higher fraction of the total withstand voltage resulting from actual power-frequency voltage distribution with the circuit-breaker fully open and one terminal earthed.
Connect the above test for Single interrupter circuit-breaker and Multi interrupter circuit-breaker is according to below pic:



2-Dielectric test on auxiliary and control circuits in operating mechanism:

A of auxiliary and control circuits, and verification of conformity to the circuit diagrams and wiring diagrams: The nature of the materials, the quality of assembly, the finish and if necessary, the protective coatings against corrosion shall be checked. A visual inspection is also necessary to check the satisfactory installation of the thermal insulation conductors, and cables shall be checked for proper routing.

B: Functional tests:

A functional test of all low-voltage circuits shall be made to verify the proper functioning of auxiliary and control circuits in conjunction with the other parts of the disconnector switch. The test procedures depend on the nature and complexity of the low-voltage circuits of the device. Check to function of Counter, Auxiliary contacts, Thermostat settings, Local/Remote operation.

C:Verification of protection against electrical shock:

Protection against direct contact with the main circuit

and safe accessibility to the auxiliary and control equipment parts liable to be touched during normal operation shall be checked by visual inspection.

D:Dielectric tests:

Only power frequency tests shall be performed. The test voltage shall be 1 kV or 2 kv with a duration of 1 s with 50 or 60 HZ frequency. This test performs on terminal and motor and auxiliary switch and control circuits.

3-Measurement of the resistance of the main circuit:

For the routine test, the d.c. voltage drop or resistance of each pole of the main circuit shall be measured under conditions as nearly as possible similar, with regard to ambient air temperature and points of measurement, to those under which the corresponding type test was made. The measured resistance shall not exceed 1,2 × Ru, where Ru is equal to the resistance measured before the temperature-rise test.

4-Tightness test :

Routine tests shall be performed at normal ambient air temperature with the assembly filled at the pressure (or density) corresponding to the manufacturer's test practice. For gas-filled systems sniffing may be used.

A: Controlled pressure systems for gas:

Find the relative leakage rate F re by measuring the pressure drop over a time period.

B: Closed pressure systems for gas:

The test may be performed at different stages of the manufacturing process or of assembling on site, on parts, components, and subassemblies. For gas-filled systems leakage detection by using a sniffing device may be used.

C: Sealed pressure systems:

* Switchgear using gas: Tightness tests on such switchgear and controlgear are performed in order to determine the expected operating life for the sealed pressure system.

* Vacuum switchgear:

Each vacuum tube shall be identified by its serial number. Its vacuum pressure level shall be tested by the manufacturer of the vacuum interrupter. The test results shall be documented. After assembly of the switchgear device, the vacuum pressure level of the vacuum tubes shall be tested by a significant routine dielectric test across the open contacts. The test voltage shall be stated by the manufacturer. The dielectric test shall be carried out after the mechanical routine test as required by the relevant product standard.

5-Design and visual checks:

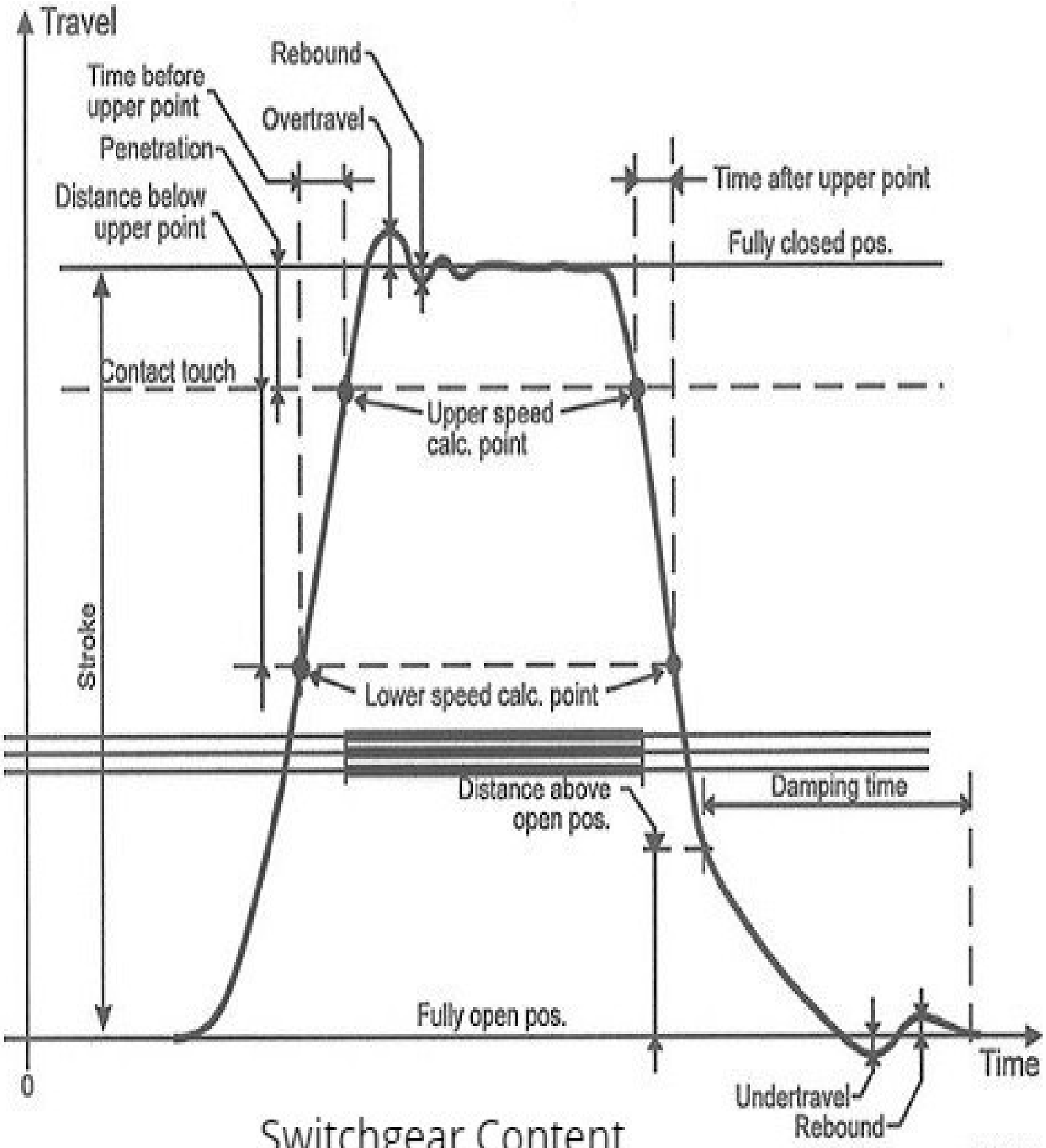
The switchgear and controlgear shall be checked to verify its compliance with the purchase specification. This items must be check :

– the language and data on the nameplates;
– identification of any auxiliary equipment;
– the color and quality of paint and corrosion protection of metallic surfaces;
– the values of the resistors and capacitors connected to the main circuit(if any).

6-Mechanical operating tests(Timing test run by semi-automatic test program):

Mechanical operating tests should be made on the complete circuit-breaker.For all required operating sequences the following shall be performed and records made of the closing and opening operations measurement of operating times.

The mechanical travel characteristics can be recorded directly, using a travel transducer or similar device on the circuit-breaker contact system or at other convenient locations on the drive to the contact system where there is a direct connection, and a representative image of the contact stroke can be achieved. Below Fig show mechanical contact curve:


Travel
Rebound
Time before upper point
Overtravel
Penetration
Distance below upper point
Time after upper point
Fully closed pos.
Contact touch
Upper speed calc. point
Stroke
Lower speed calc. point
Distance above open pos.
Damping time
Fully open pos.
Time
0
Undertravel
Rebound
13-0181

The number of points recorded shall be sufficient to derive the time to, and contact speed at, contact touch and contact separation, together with the total travel time.

Mechanical operating tests shall include the following:

a) at maximum supply voltage of operating devices and of auxiliary and control circuits :

– five closing operations;

– five opening operations.

b) at specified minimum supply voltage of operating devices and of auxiliary and control

circuits:

– five closing operations;

– five opening operations.

c) at rated supply voltage of operating devices and of auxiliary and control circuits :

– five close-open operating cycles with the tripping mechanism energised by the closing of the main contacts;

– moreover, for circuit-breakers intended for rapid auto-reclosing ,five open-close

operating cycles O – t – C where t shall be not more than the time interval specified for the rated operating sequence.

-Check the damping device.

- Check of overcurrent protection

After completion of the required operating sequences, the following tests and inspections shall be performed (if applicable):

– connections shall be checked;

– the control and/or auxiliary switches shall correctly indicate the open and closed positions of the circuit-breaker;

– all auxiliary equipment shall operate correctly at the limits of supply voltage of operating.

_devices and of auxiliary and control circuits and/or pressures for operation.

– measurement of the resistance of heaters (if fitted) and of the control coils.

– inspections of the wiring of the control, heater and auxiliary equipment circuits and checking of the number of auxiliary contacts, in accordance with the order specification;

– inspection of control cubicle (electrical, mechanical, pneumatic and hydraulic systems).

– recharging duration(s);

– functional performance of pressure relief valve.

– operation of electrical, mechanical, pneumatic or hydraulic interlocks and signalling devices;

– operation of anti-pumping device.

– general performance of equipment within the required tolerance of the supply voltage.

– inspection of earthing terminals of the circuit-breaker.

For circuit-breakers fitted with under-voltage opening releases, it shall be shown that the circuit-breaker opens and can be closed when voltages within the specified limits are applied to the releases.

References:

* IEC 62271-1 High-voltage switchgear and controlgear –Part 1: Common specifications.

*IEC 62271-100 High-voltage switchgear and controlgear –Part 100: Alternating-current circuit-breakers.

* Live Tank Circuit Breakers Routine testing From ABB company.

*Testing High Voltage Breakers from Megger company.

*A Systematic Approach to High-Voltage Circuit Breaker Testing by Charles Sweetser Omicron company.

* The Optimum Tests For High Voltage SF6 Circuit Breaker In The New Substation Before Energize with the national grid.A. Saravanan, Amer Nasr A. Elghaffar, Yehiasayedm. Ali, Adel A. Elbaset Mohamed.

Sampling Small Gas Volume in Transformer

Engr. Qazi Arsalan Hamid

Why Gases Generates in insulating oil of Transformer

- Due to high volume and small volume faults

- During sampling process, outer surface may enters

- In nitrogen-blanketed transformers, the gases generated by a fault will partition between the gaseous and liquid phases. On transformers with gas-collector relays, gas in the form of bubbles may collect in a gas-collector relay and provide a means to obtain a gas sample for analysis.

Precautions:

- Do not conduct any sampling on energized instrument transformer

Apparatus:

- Syringe, gastight, 5-mL, with luer loc termination.

- Stopcock, three-way, plastic.

- Length of PTFE Tubing, 1⁄8 in. inside diameter.

Procedure:

Step 1: Connect stopcock with PTFE Tubing

Step 2: Connect other end of PTFE Tubing to Gas collector Relay/Buchholz Relay

Step 3: Open the Valve of buchholz Relay/Gas collector relay, gas from buchholz relay enters in stopcock (handle at this of stopcock must be open during gas collection), during this process the collected or entered gas replace air in PTFE tubing and stopcock, then turn off this side handle of stopcock

Step 4: Connect the syringe to the stopcock

Step 5: Turn the stopcock handle to allow gas from the gas space to enter the syringe, taking care that gas pressure does not eject the plunger completely.

Step 6: Turn the stopcock so gas can be expelled from the syringe through the exhaust port of stopcock by pushing plunger home.

Step 7: Open the stopcock to connect gas space to syringe and fill syringe. Close the stopcock by turning handle toward the syringe.

Step 8: Close the valve on the gas space.

Step 9: Remove the plastic tubing from the valve and stopcock, leaving the stopcock on the syringe.

Step 10: Label the sample, package carefully, and transport to laboratory for analysis.

Reference: ASTM D 3305 – 94

Psychology of Engineer

Engr. Ruthaba Shaikh

During Engineering Education(ascending order from 1st year to final year)

*. I am going to be Engineer.
*. I will work hard.
*. I will definitely do a lot of internships.
*. I will learn a lot of new things.
*. I will ask a lot of Questions.
*. Next Time I will prepare well for Exam
*. I will not ask questions in class.
*. I will bunk this class as others did.
*. I will show smartness when marking proxy next time.
*. I will participate in all extracurricular activities also.
*. I will pay attention to my study, extracurricular activities are disturbing.
*. I will do this software course. It will help me in the job.
*. I will do combined study in this year.
*. I will not do combined study this time. It is distraction.
*. I will start applying in this semester, next semester I will be graduated.
*. I will correct my resume and ready to pay money for it.

(After Graduation, To get chance of appearence in different organization's talent hunt program)

(after 15 days)

*. I will be in touch with head of industrial liaison department to get chance of appearance in different organization's talent hunt program.

(after 2 days)

*. I will be in touch with Computer operator of industrial liaison department to get chance of appearance in different organization's talent hunt program.

(after 15 days)

*. I will be in touch with Security Guard of industrial liaison department to get chance of appearance in different organization's talent hunt program.

(after 25 days)

*. I will be in touch with Seniors of our department to get chance of interview in their company, and also read Job section of newspapers daily

(after 25 days)

*. I will be in touch with Seniors of our department to get chance of interview in any company of the world, and also read Job section of newspapers daily

(after 35 days)

*. I will be in touch with Seniors of any department to

values, the altitude factor should be considered. The power frequency voltage test is performed with the circuit-breaker in the open position only. This is valid for both single and multi-unit circuit-breakers.

get chance of interview in any company of the world, and also read Job section of newspapers daily

(after 6 months of struggle, nervous breakdowns, heartache,headache and some censored aches)1st Job as Trainee Engineer

(1st day)

*. I will make my parent proud.

*. I will do hard work.

*. I will stay late in office.

*. I will learn a lot in less time.

*. My Immediate supervisor is always right.

*. My Immediate supervisor is my mentor.

*. My Immediate supervisor is best man or woman on planet earth.

(15th day)

*. My Immediate supervisor is always wrong.

*. My Immediate supervisor is biased.

*. My Immediate supervisor is worst man or woman on planet earth.

*. I am no use for them.

(45th day)

*. I will get admission in MBA.

*. My Immediate supervisor is always wrong.

*. My Immediate supervisor is biased.

*. My Immediate supervisor is worst man or woman on planet earth.
*. I am no use for them.

(65th day)

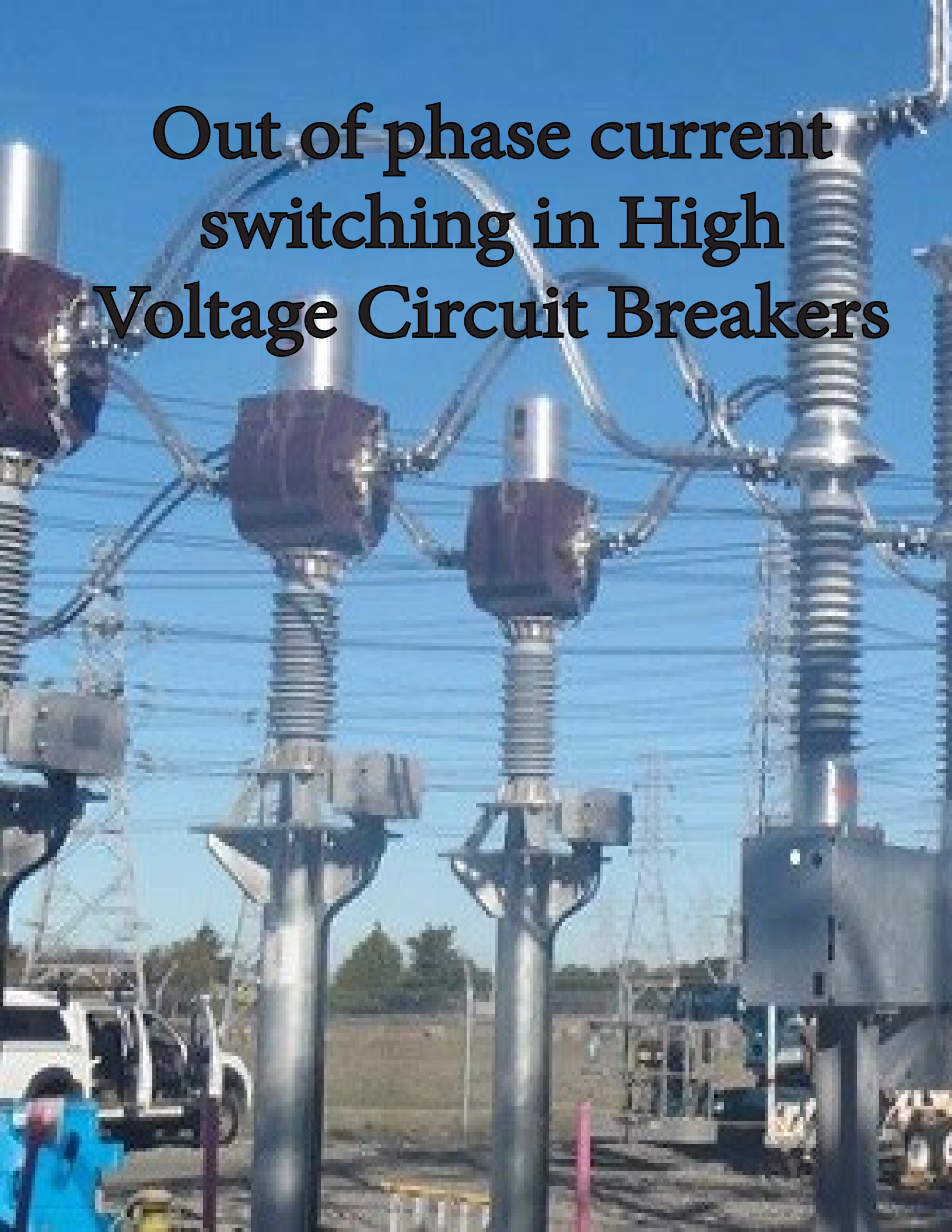
*. I will get admission in MBA.
*. O God where am I trapped?
*. How my friend got job in that brand? Reference!
*. My Immediate supervisor is always wrong.
*. My Immediate supervisor is biased.
*. My Immediate supervisor is worst man or woman on planet earth.
*. I am no use for them.

(After Probation period)

*. I will get admission in MS.
*. At least now I am Production Engineer and got $200 raise.
*. Now my job is secure.
*. My Immediate supervisor, he or she hates me
*. Why Facebook is not working on my computer
*. Why i am unable to download new movie torrent on my laptop

.....(To be continue)

Out of phase current switching in High Voltage Circuit Breakers




Engr. Ali Sepehri

What is out of phase switching phenomenon:

Out-of-phase switching conditions occur for #circuitbreakers at a coupling of two network parts of equal operating voltages, the equivalent sources of which have different phase angles, partly or entirely 180 degree out of phase.

A difference in the phase-angle of the rotating vectors representing the source voltages causes out-of-phase currents across the connection, which must be interrupted by a circuit-breaker at either side of the connection.

As regards the TRV, the specialty of this switching duty is the presence of active sources on both sides of the circuit-breaker. This is explained in Figure 1 with sources S1 and S2.

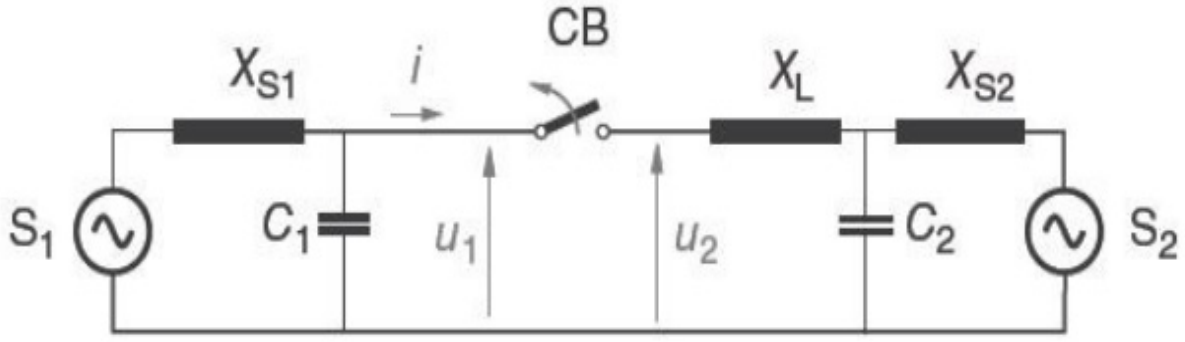


Figure 1

Considering the fault-switching duties discussed before, in all cases the load-side TRV component decays to zero. In the out-of-phase situation, however, the S2-side TRV component will decay to the power-frequency RV of the S2-side source. This is outlined in Figure 2 where the voltage phase difference between both sources is assumed to be 90 degree and the short circuit reactants are considered equal.

As a result, the out-of-phase switching duty is characterized by a very high TRV peak with a moderate RRRV and a moderate current. Because the TRV of the out-of-phase test duty shows the highest peak value of all switching duties, it is often used as a reference for other special switching conditions, such as clearing long-line faults or faults on series- compensated lines.

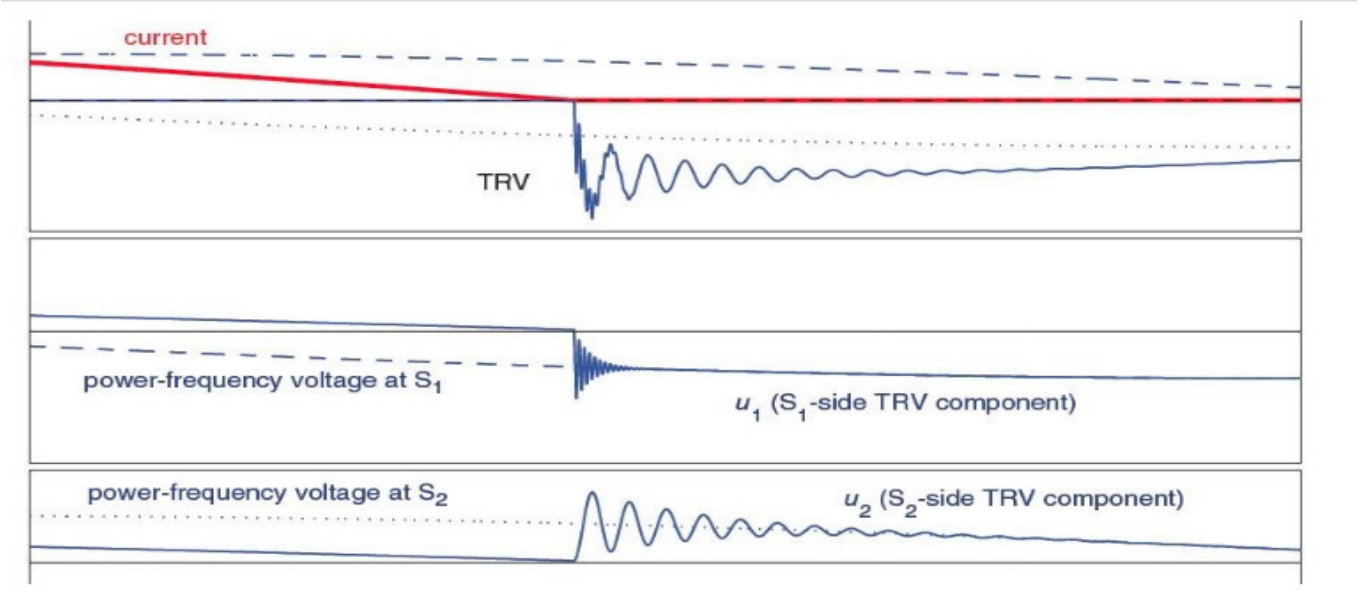


Figure 2

Two cases in which out-of-phase conditions may occur are shown in Figure 3.One case occurs when a generator is accidentally switched by circuit breaker on to the network at the wrong phase angle (left schematic). The other case occurs when different parts of a transmission network lose their synchronism, e.g. due to a short-circuit somewhere in the network (right schematic).
In both cases, an out-of-phase current will flow in the networks and will have to be interrupted by the circuit breaker.

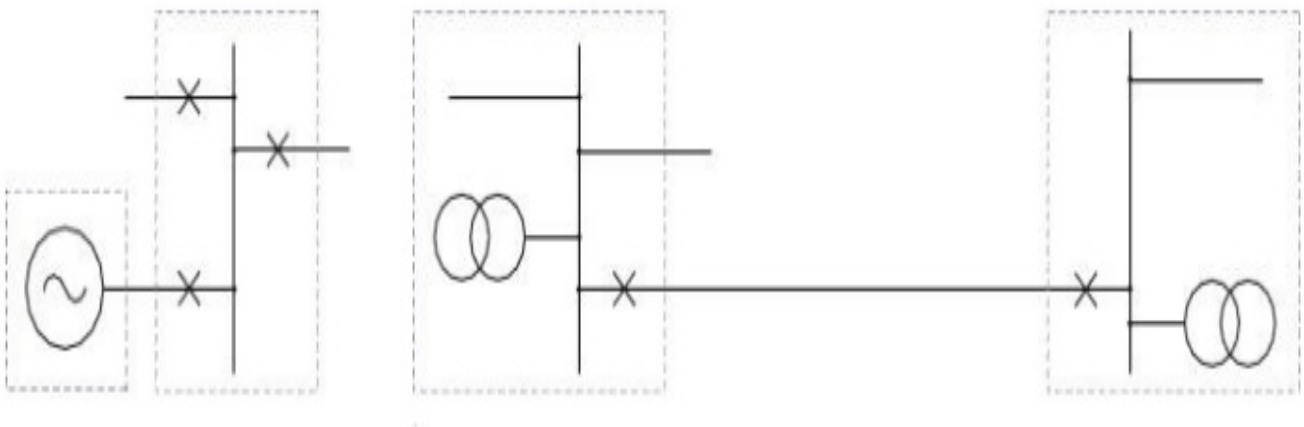


Figure 3

Now explain each case in details:

1-Switching between Generator and System:

Switching between the generator and power system may take place at the #highvoltage side or at the medium voltage side of the transformer when a step-up transformer is applied. Switching may be faced during system disturbances or during tripping of the power plant, but can also happen during synchronization and mis-synchronization.
The severity of the out-of-phase condition depends on the out-of-phase angle between the generator and network as well as on the excitation of the generator rotor. Usually the excitation control will reduce the rotor field as fast as possible. Power plants are equipped with out-of-step protection, synchro-check equipment and synchronization equipment, among others.
we can see this lay out in Figure 4:

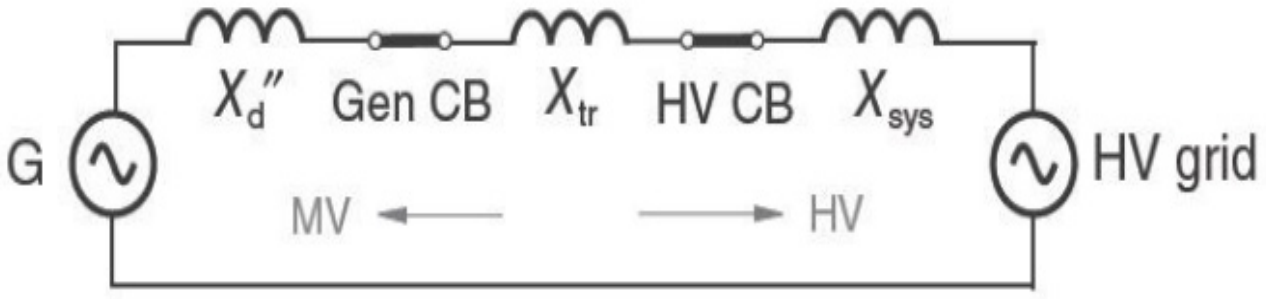


Figure 4

2-Switching between Two Systems:

Switching between two power systems typically occurs in situations with power unbalance and system instability. Examples refer to large system disturbances, situations during system restoration, and due to the mis operation of protection systems.
The more important transmission lines may be equipped with an out-of-phase blocking in their protection system and/or a special system-wide protection may be applied to prevent separation of the systems under severe out-of-phase conditions.

Conclusions of out-of-phase phenomena:

*. The rated out-of-phase currents have been proposed to be 25% of the rated short-circuit current. For economic and statistical reasons, minimum peak values from the TRV analyses have been proposed: a RV of 2.0 p.u. and an overshoot of 25% .
*. As system separation goes with cascading tripping of overhead lines and thus an increase of the system impedance, a maximum value of 25% of the rated short circuit current seems to be reasonable, even today.
The maximum value of the out-of-phase current is an

important parameter for the high voltage circuit breaker capabilities.

*. Large disturbances show out-of-phase angles much larger than the 105 degree to 115 degree values associated with the #TRV peak values in the standards. This applies both to radial and meshed networks; however, historical events have shown that large out-of-phase angles may occur at the same time as low operating voltages. The combination of a large out-of-phase angle and low operating voltage yields TRV peak values similar to those mentioned in the standards for situations with a relatively low out-of-phase angle and rated voltage (maximum operating voltage).

*. Transmission system circuit breakers used to connect or disconnect conventional power plants may be subjected to out-of-phase switching as well. To disconnect power plants during unstable power swings, the same considerations as for system separation are applicable albeit with care for the possibility that a transformer limited fault test condition has to be specified.

*. To disconnect power plants due to faulty synchronization, similar conditions and requirements as described for medium voltage generator circuit breakers are applicable, and simulations are necessary to judge whether a design can fulfill the duty. Simulations of such events should include the response time of protection systems, the depression phenomenon of the generator voltage, and the acceleration/deceleration of the rotor to identify whether the out-of-phase current and the #TRV after false synchronization of generators cover the conditions prescribed by the user, for instance, 180 degree.


EARTH FAULT INDICATOR
Mod. EFI.06
VERSION
1 Flash=Batt. OK
Flashing=Low Battery
PRESS FOR
TEST OR
RESET
C.E.DI.T. S.r.l. www.ceditnet.it
Turin - ITALY - Tel. +39 011 6801 222
Customer Serial no.

DEVELOPMENT OF THE COMMUNICATION CIRCUIT FOR SMART EARTH FAULT LOCALIZATION USING EARTH FAULTS INDICATOR

Engr. Qazi Arsalan Hamid

With the rapid increase in power system it is impossible to control and monitor each system separately. Moreover faults on the power system not easy to locate. So, new technologies for the purpose of fault diagnosis and trouble shooting, has been introduced.

The electrical distribution network has been constructed and designed at its best but sometimes fault may develop on electrical network. The fault can be for example is caused by decay and deterioration due to aging and wear, by weather conditions. Due to these faults either a customer supply is lost or the performance of network is affected. So whatever and wherever the faults occur, it has to be located before it can be repaired using the efficient system.

When the system is operating normally the three phase load currents summate vectorially to zero but whenever there is some sort of imbalance of the current occurs in the system then the current flows from the phase conductors to earth conductor form the point of insulation breakdown. This fault occurs due to insufficient insulation between earth and phase conductor. It mostly occurs in cable networks. It is most frequent of all faults in an electrical power system .In the electrical distribution system, EARTH FAULT

INDICATOR is a device used to identify the location of earth fault in a system. EFI is also known as Fault Passage Indicators or Ground Fault Indicator. It is installed at various points in the system e.g. on cable ends at Grids, substations, PMTS and running poles. It senses the condition whether the fault current is passed where it is located or not. If there is fault then it gives indication by Red Led.

The hardware phase of the project high lightens on the development of smart fault location circuit using Earth Fault Indicator.

*.1 SCOPE OF PROJECT

There are two phases of this project.
1. Software phase.
2. Hardware phase.

..1 SOFTWARE PHASE:

Any project before its development must be checked by simulating the circuits on any simulating software. The system model configuration is so simple. The simulation is being done to know the performance of the system without going into the construction phase. And it is also known that the process of simulation is easy and safe to

handle. The whole process of simulation is shown by hierarchal approach given below in figure 1.1.

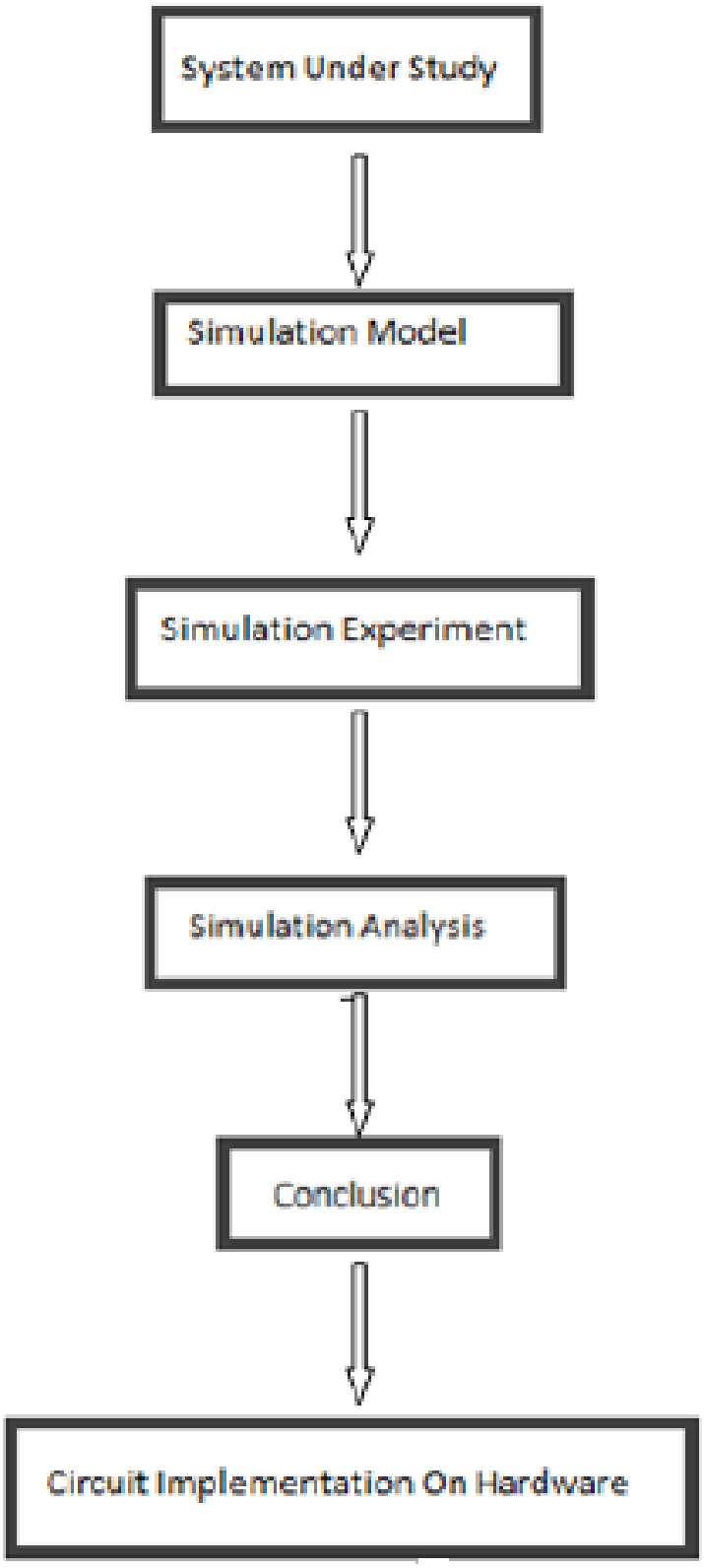


FIGURE 1-1: SIMULATION PROCESS

We performed simulation on PROTEUS 8.0.The circuit consists PIC 16F877A and programming for PIC has been done on PIC C W in c language. The program has been built into the controller and then run the simulation in proteus environment. It has given the desired results. The following figure shows what steps are performed to build the program in controller. Then run the simulation. If there is no error then move on but if there is any error again build the .HEX file or may rewrite the program. The hierarchal approach of this is shown in figure 1.2.

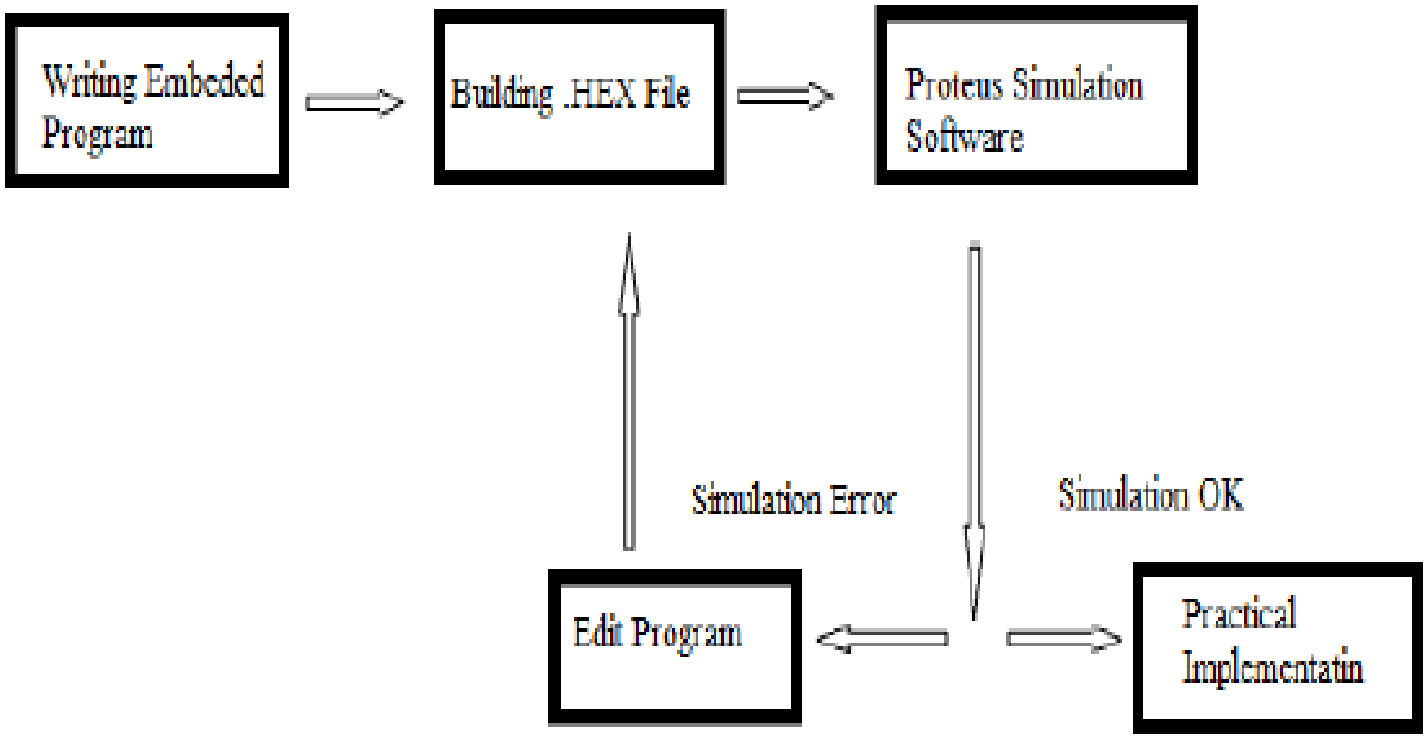


FIGURE 1-2: SIMULATION ANALYSIS

..2 HARDWARE PHASE:

Secondly, the hardware phase includes the development of cost and time efficient smart earth fault location system.

The scope of this project is to develop a system that locates the earth fault within less period of time which mostly occurs in distribution side. This benefits both the suppliers and consumers. This smart earth fault location circuit includes the sms sending to the operator in the control room on the occurrence of earth faults. This scheme saves both time and cost. This system will have its value in electrical power distribution network for its time efficiency.

The development of the smart earth fault localization system is actually the last stage and the second phase of the project which contains the pro-type circuit of the smart fault system.

*.2 Background

Power system has been in operation from hundred years now. There are number of fault occurring on the power system and all faults are not equally likely to occur. Fault statics with reference to type of fault are shown in Table 2.1:

TABLE 2-1: FAULT STATICS WITH RESPECT TO TYPE OF FAULTS

FAULTS	PROBABILITY OF OCCURANCE	SEVERITY
L-G	85%	Least severe
L-L	8%	
L-L-G	5%	
L-L-L	2%	Most severe

The probability of occurrence of faults on different elements of power system is not same. So, the fault statics with reference to power system elements are shown in Table 2.2:

TABLE 2-2: FAULTS STATICS WITH RESPECT TO POWER SYSTEM ELEMENTS

POWER SYSTEM ELEMENTS	PROBABILITY OF FAULTS
Overhead Lines	50
Underground Cables	9
Transformers	10
Generators	7
Switchgears	12
CT,PT Relays, Control Equipment	12

*.2.1 EARTH FAULTS

All the faults that involve the ground are called earth fault. The examples of earth fault are the single line to ground fault and double line to ground fault.

*2.1.1 SINGLE LINE TO GROUND FAULTS

The fault in which single conductor comes in contact with the ground as shown in figure 2.1.

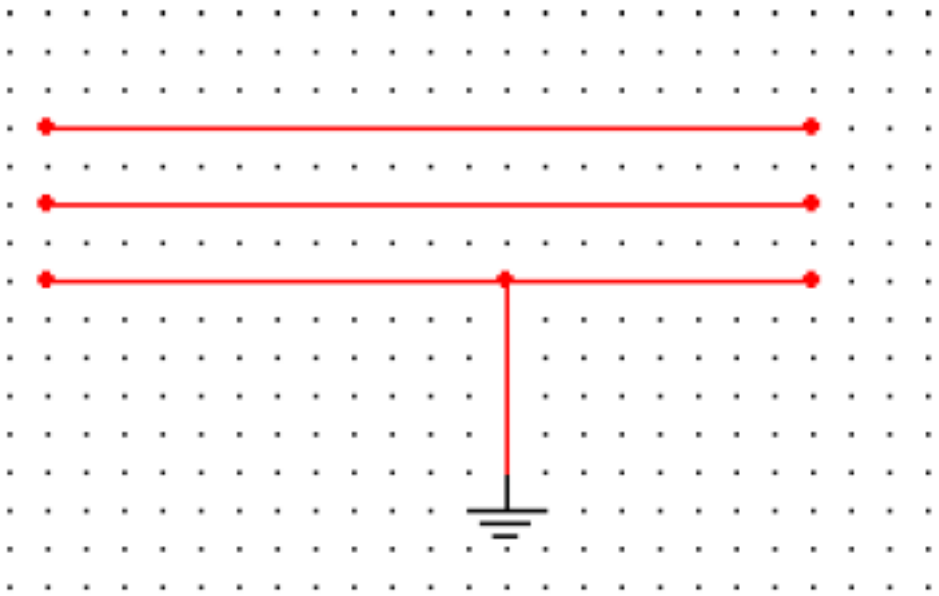


FIGURE 2-1: L-G

2.1.2 DOUBLE LINE TO GROUND FAULT

The faults in which two conductors come in contact with the ground as shown in figure 2.2.

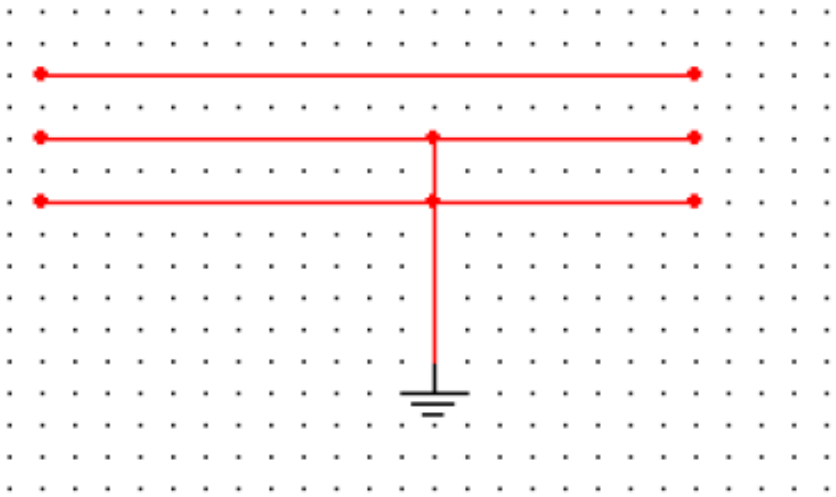


FIGURE 2-2: L-L-G

The other faults that do not involve earth are called phase faults. For the protection of elements of the power system from the earth faults, the protective scheme is used that is named as earth fault protection.
The fault current occurring in existing cable networks and overhead distribution networks are mostly earth faults or short circuit faults. The major concern for power engineering companies is the time consumption and the expenditure that is required for the fault recovery in the network. Therefore it is essential to improve the network such that the power engineering companies can detect the faulted place quickly and with least expense. Reduction in this time leads to reduction in Blackouts and expenses.

*.2.2 EARTH-FAULT INDICATOR

*. 2.2.1 INTRODUCTION

EFI acronym for Earth-Fault Indicator is an earth fault detection instrument by means of which, and following to the high asymmetrical current flowing in a 3-core cable ,an earth fault is indicated by a flashing LED or a red indicating disk when the fault current exceeds the set trip current.

It is a two-component instrument which consists of:

*.2.2.1.1 CURRENT TRANSFORMER

The donut type C.T. consists of a split core which is formed by coated plates which is encapsulated by a coil.

*.2.2.1.2 INDICATION FACILITY

A flashing LED or a red indicating disk is used as indication facility.

The EFI is used in MV networks (11kV) with a single sided feed system or in an open ring main system with its current transformer is connected around the outer sheath of a three phase conductor to the incoming feeding or the outgoing cable .

*.2.2.2 EVOLUTION

The history of EFI goes back to 1946 when EFI from a German company Horstmann came into the market. Subsequently the E.O. Schweitzer Manufacturing Company introduced a product in the U.S.A market in 1948. Primarily the fault indicators were manual reset devices. But with advancement in technology the earth fault indicators can automatically reset on system restoration, by applying a certain voltage or after a set period of time. Recently fault indicators are able to communicate their status via cell or radio signals to a centralized control room, portable

device like mobile phones, or pole-mounted receiver. Our Project is to introduce such a communication circuit for EFI in KE which communicates its status via SMS.
Recent improvements are also done to include a remotely programmable overhead line indicator, fault indication for paper-insulated lead cable, and an overhead fault indicator for mesh networks for earth fault detection. Research is also being done on contactless EFIs

*. 2.3 HARDWARE INTERFACING

When fault occurs, a signal from EFI is taken to the microcontroller which is interfaced with a GSM module .The microcontroller converts the EFI signals to SMS form in order for the GSM transmitter to send it through the channel. At the other side of the communication channel is the receiver circuit, which converts the signals again into text form which is then received in the control roomas illustrated in figure 2.3.

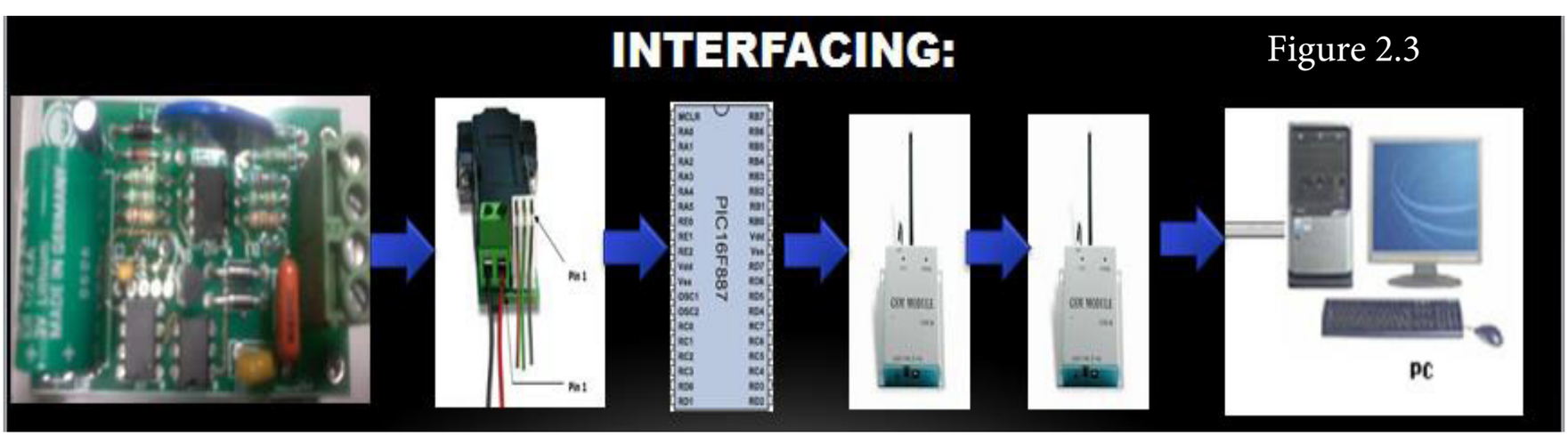


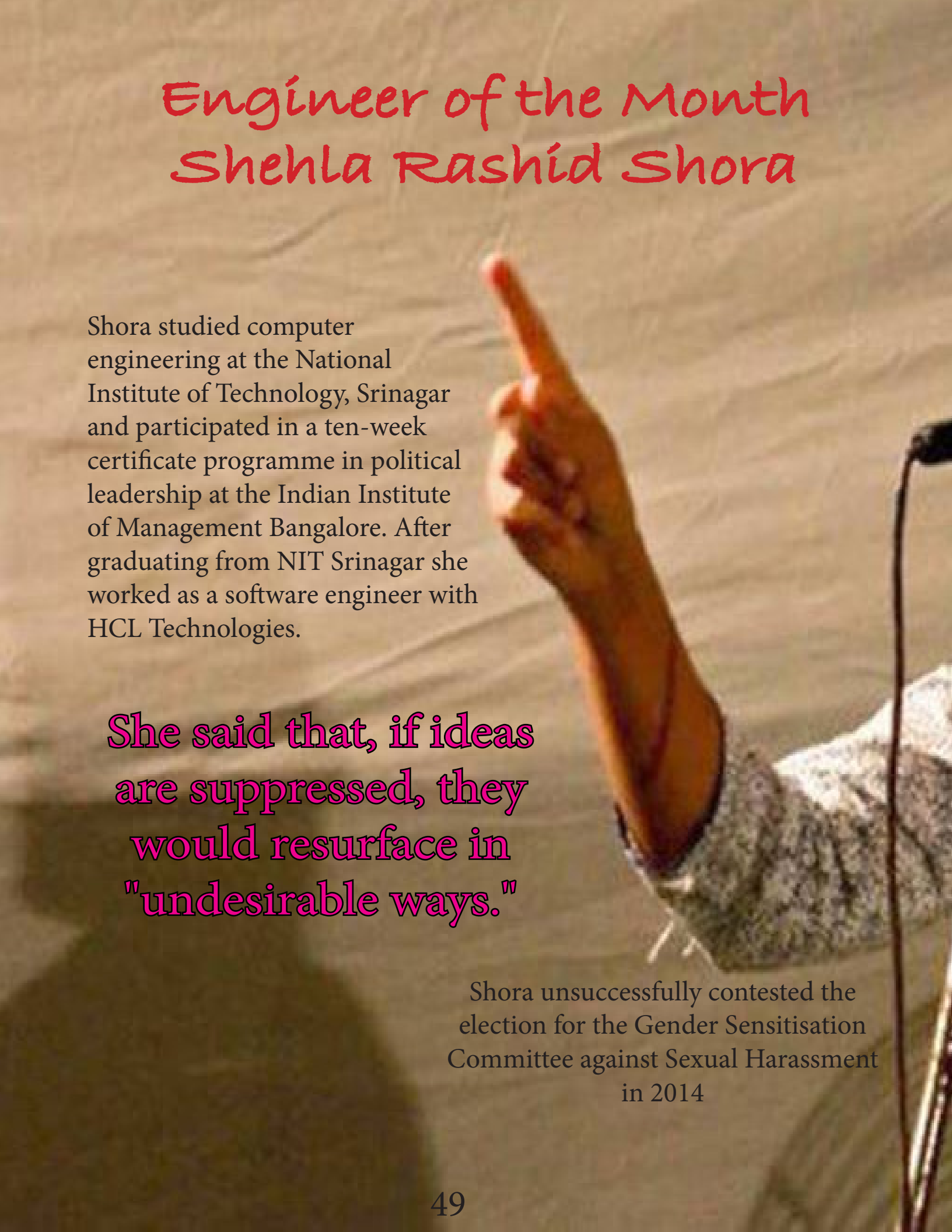
Figure 2.3

.....(To be Continue)

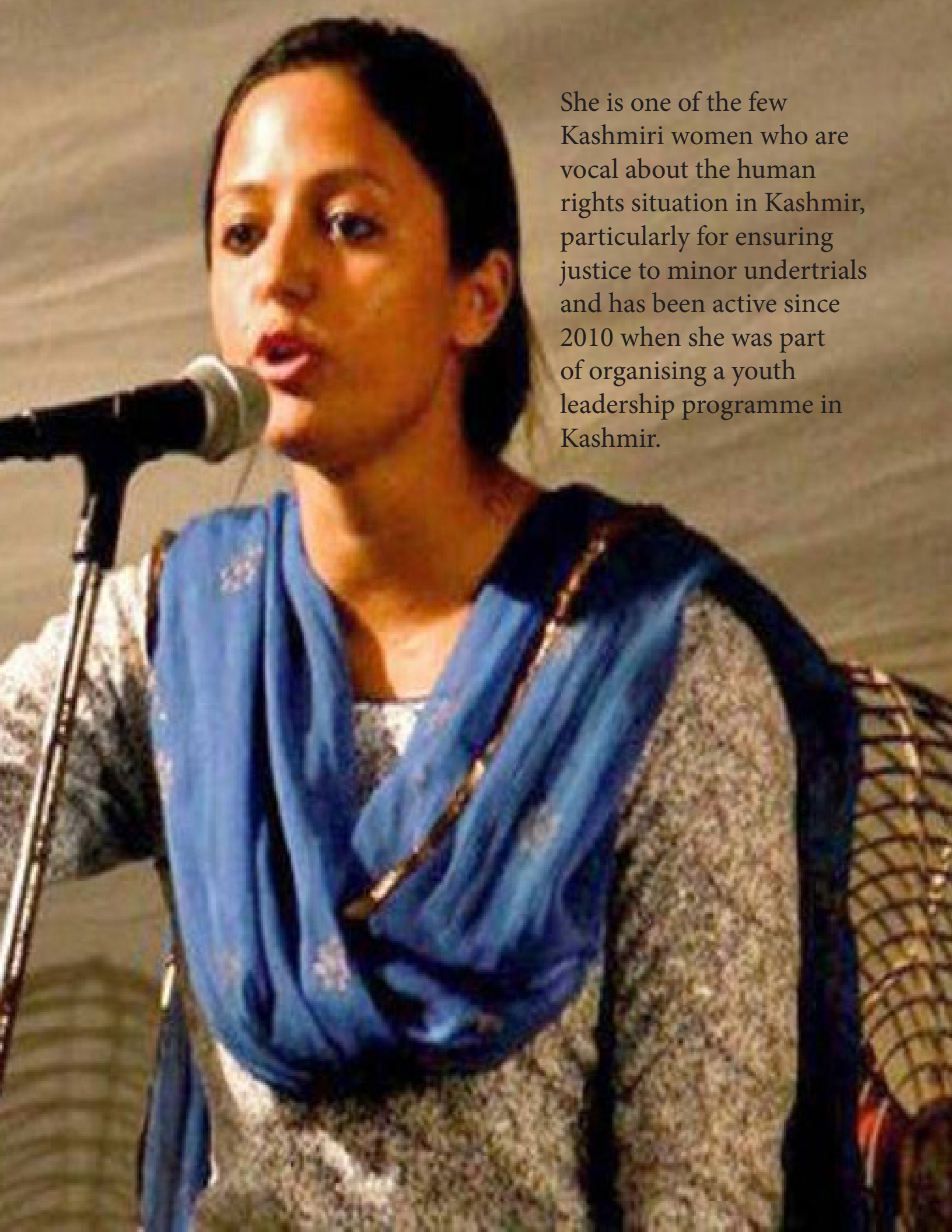
Engineer of the Month
Shehla Rashid Shora

Shora studied computer engineering at the National Institute of Technology, Srinagar and participated in a ten-week certificate programme in political leadership at the Indian Institute of Management Bangalore. After graduating from NIT Srinagar she worked as a software engineer with HCL Technologies.

She said that, if ideas are suppressed, they would resurface in "undesirable ways."



Shora unsuccessfully contested the election for the Gender Sensitisation Committee against Sexual Harassment in 2014



She is one of the few Kashmiri women who are vocal about the human rights situation in Kashmir, particularly for ensuring justice to minor undertrials and has been active since 2010 when she was part of organising a youth leadership programme in Kashmir.

Voice of Engineers

Dur to visit Visa hiring in Gulf, the regulation in Job Market is affected, and most of the time, employee prefer low salary incompetent job applicant on talented employee

(Engineer Gulfam Hameed)

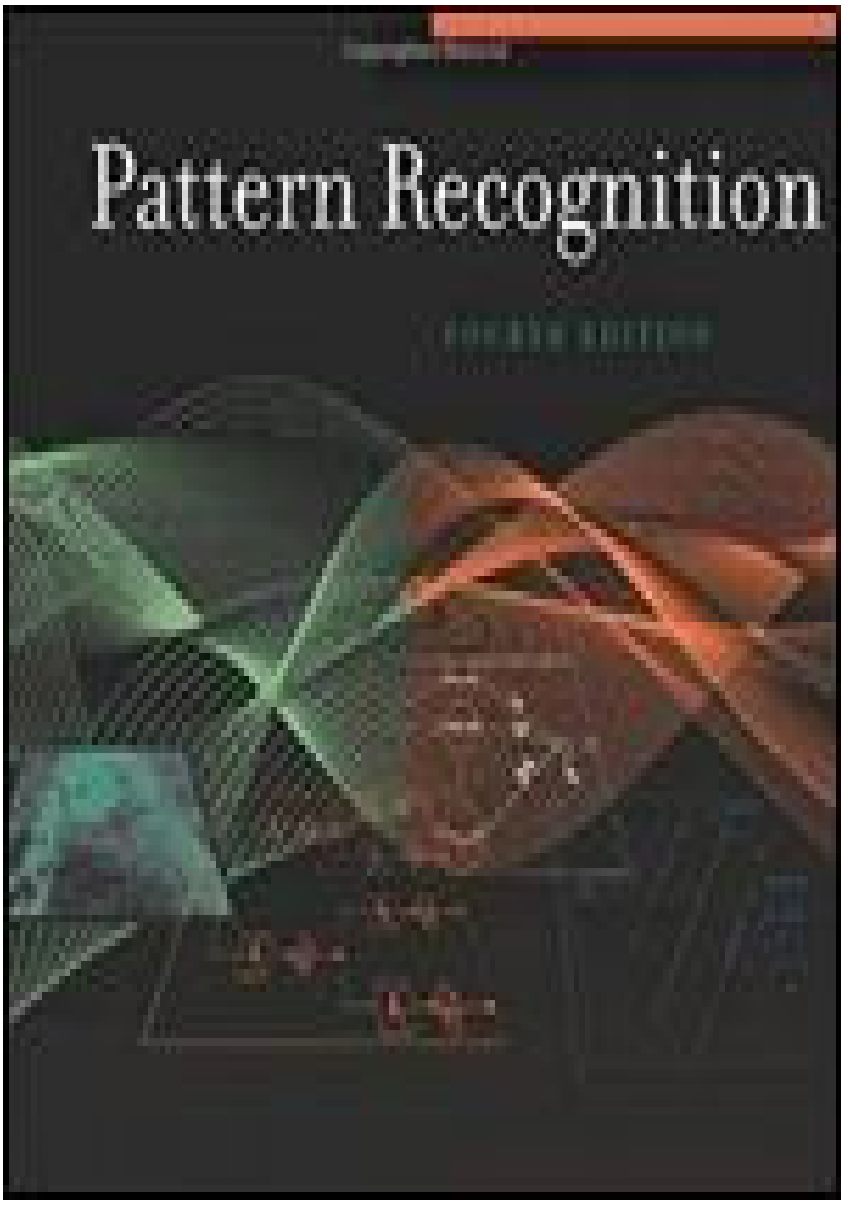
Online Recuiters are the biggest source of illegal and fraud hiring in companies

(Engineer Sarah Iqbal)

Quota system is destroying the talent of Pakistan. This system were introduced in 1952 to bring equality in country job market by establishing valuable educational institutes. As per the legal binding of Quota system, it was short-term solution but still persists in system of our country. (Engineer Ali Ruhail)

Book of the Month

Pattern Recognition



This book considers classical and current theory and practice, of supervised, unsupervised and semi-supervised pattern recognition, to build a complete background for professionals and students of engineering.

The authors, leading experts in the field of pattern recognition, have provided an up-to-date, self-contained volume encapsulating this wide spectrum of information.

Please Send your articles and feedback before 28th Nov 2018 to get it publish in Dec 2018 issue.

enpak2017@gmail.com